



Patent claims:

1. Sensor device for detection of gases or vapors contained in air with a sensor element, wherein the sensor element exhibits a gas sensitive layer and wherein the sensor element is electrically heatable with a heating structure, and wherein the sensor element is disposed in a casing (40), which casing shields the sensor element (11) from air motions occurring outside of the casing (40), characterized in that the casing (40) exhibits the diffusion layer (47), wherein a passage of gas and vapor from the outside into the interior of the casing (40) and vice versa is possible through the diffusion layer (47) by diffusion, and wherein the casing (40) and the diffusion layer (47) are constructed heat insulating or thermally insulating.

2. Sensor device according to claim 1 characterized in that the diffusion layer (47) is formed out of a sinter material with a glass like or metallic structure.

3. Sensor device according to claim 1 characterized in that the diffusion layer is formed out of a gas permeable plastic foil.

4. Sensor device according to claim 1 characterized in that the sensor element (11) is a metal oxide sensor.

5. Sensor device according to claim 4 characterized in that the plastic foil comprises Teflon (PTFE).

6. Sensor device according to claim 1 characterized in that the sensor element (11) exhibits a heating structure (32) for the electrical heating of the sensor element.

7. Sensor device according to claim 6 characterized in that the heating structure (32) is a structured platinum layer.

8. Method for operating a sensor element for detection of gases or vapors

contained in air, wherein the sensor element exhibits a gas sensitive layer and wherein the sensor element is electrically heatable by way of a heating structure, characterized in that the temperature of the sensor element (11) is automatically controlled and the temperature set point value is at least part-time changed by way of a perturbation value switch on depending on the size or the time behavior of the sensor signal.

9. Method according to claim 8 characterized in that the sensor signal is compared with reference value formed slidingly or adapted out of sensor signals of times past, wherein the difference between the sensor signal and the reference value and/or the time behavior of this difference is employed for triggering a switching signal.

10. Method according to claim 8 characterized in that the electrical resistance of the heating structure (32) furnished with a temperature coefficient is employed as an automatic control value for the temperature of the sensor element (11).

11. Method according to claim 8 characterized in that the temperature of the gas sensitive layer (33) is not maintained constant but a perturbing value switch on increasing the temperature of the gas sensitive layer (33) is performed depending on the time behavior of the sensor signal such that such perturbing influences, which are caused by changes of the physical surrounding conditions are distinguishable from such influences which are caused by a change of the gas composition or of the gas concentration based on the time behavior of the sensor signal.

12. Method according to claim 8 characterized in that the heating power is influenced for short time by the sensor signal by way of the perturbing value switch on that a change of the sensor signal, which is caused by a change of the air humidity or by a change of the air temperature is compensated quicker and/or to a larger extent as a change of the sensor signal which is caused by a change of the gas concentration.

13. Method according to claim 12 characterized in that a change of the sensor signal, which is caused by a change of the air humidity or at change

in the air temperature is distinguishable from a change of the sensor signal which is caused by a change in the gas concentration by way of the in each case different time behavior of the sensor signal.

14. Method according to claim 12 or 13 characterized in that the distinction between change of the sensor signal, which is caused by a change in the air humidity or by a change of the air temperature and a change of the sensor signal, which is caused by a change of the gas concentration is performed automatically by way of suitable software.

15. Method according to claim 8 characterized in that an average value is formed out of sensor signals from times past and that the reference value suitable for triggering a switching signal is formed out of the average value for the at each time actual sensor signal, wherein the average value formation is suspended for the time period of the perturbing value switch on.

16. Method according to claim 15 characterized in that the characterizing curve of the sensor element is taken into consideration for formation of the

reference value.

17. Method according to claim 9 characterized in that the average value formation is suspended and the old reference value is maintained for that time period during which the actual sensor value is smaller as the reference value formed out of the average value for detection of oxidizable air contents substances.

18. Method according to claim 15 characterized in that the average value formation is suspended and the old reference value is maintained for that time period during which the actual sensor value is smaller as the reference value formed out of the average value for detection of oxidizable air contents substances.

19. Method according to claim 15 characterized in that the time period of averaging taken into consideration for formation of the average value is variable.

20. Method according to claim 9 characterized in that the formation of the reference value is performed by taking into consideration sensor signals of times past, wherein the length of the time period taken into consideration is variable.

21. Method according to claim 9 characterized in that the formation of the reference value is performed by taking into consideration reference values of times past, wherein the length of the time period taking into consideration in this context is variable.

22. Method according to one of the claims 19 through 21 characterized in that the length of the time period taken into consideration depends on the time behavior of the sensor signal.

23. Method according to claim 8 characterized in that the sensor signal is averaged at the same time over two different time periods, wherein a certain amount is subtracted from the average value formed over the longer time period and that a switching signal is triggered, when the average value

formed over the shorter time period becomes smaller than the value resulting from the averaging over the longer time period and subtraction of the certain amount.

24. Method according to claim 8 characterized in that the temperature of the heating structure is periodically temporarily increased and the sensor signals are compared prior to, during, and after each temperature increase for a qualitative determination of a presence of additional oxidizable or, respectively, reduceable air contents substances.

25. Method according to claim 8 characterized in that the change of the impedance of the gas sensitive layer (33) is employed for forming of sensor signal.

26. Method according to claim 8 characterized in that the change of the electrical resistance of the gas sensitive layer (33) is employed for formation of a sensor signal.



27. Method according to claim 9 characterized in that additionally a lower barrier is determined for the reference value, wherein the reference value can never undershoot the lower barrier and wherein the lower barrier cannot be reached by sensor caused variations, wherein the gas concentration which can be coordinated to this sensor signal does not inflict permanent damages to the human being or, respectively, is disposed in a far safety distance relative to the explosion barrier in case of for example a monitoring of explosion limits.